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Beta Radioactivity in Environmental Air and Precipitation at Los Alamos, New Mexico, for 1967

by

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BETA RADIOACTIVITY IN ENVIRONMENTAL AIR AND PRECIPITATION AT LOS ALAMOS, NEW MEXICO, FOR 1967

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ABSTRACT

Beta activity of particulate matter in both air and precipitation for 1967 are reported for Los Alamos, New Mexico. The declining activities found in January through April seem to be residual fallout from the 1966 foreign nuclear weapons tests, and the December high to late 1967 efforts. The May through September increases reflect the increasing rainfall of that period.

INTRODUCTION

Measurement of beta activity of particulate matter in both air and precipitation is part of the environmental monitoring program at Los Alamos. The sampling station is located at TA-50, about 1-3/4 miles southeast of the Administration Building of the Los Alamos Scientific Laboratory. The samplers are on the roof of the building. Daily samples are collected.

The results reported here continue the measurements reported in Radioactive Fallout Data, 1958, G. M. Dunning, editor, U. S. Atomic Energy Commission, U. S. Government Printing Office, Washington (March 1959); LAMS-2397 (November and December of 1958 and all of 1959); LAMS-2499 (1960); LAMS-2702 (1961); LAMS-2870 (1962); LAMS-3071 (1963); LA-3245-MS (1964); LA-3516-MS (1965); and LA-3663 (1966).

The declining activities found in January through April seem to be residual fallout from the 1966 foreign nuclear weapons tests, and the December high to late 1967 efforts. The May through September increases reflect the increasing rainfall of that period.

BETA ACTIVITY OF PARTICULATE MATTER IN AIR

Airborne radioactive particulate matter is collected on 4-in.-diam filters (MSA catalog number CR 17651). The sampling rate has been reduced from the previous 46 m^3/hr to 25.5 m^3/hr due to the addition of an activated charcoal filter behind the MSA filter. Air samples are ordinarily collected for 24-hr intervals during the work week, and weekend samples are collected for a 72-hr period. Filters are changed at approximately 0900.

The filter papers are counted for beta activity 7 days after collection in a thin-window gas (methane) flow proportional counter, with an overall efficiency for ^{90}Sr - ^{90}Y of 50%. In September of 1966, a large chamber was added to the Sharp Widebeta Counting System that permits the

counting of these air samples in the same geometry as the precipitation samples. The efficiency for ^{90}Sr - ^{90}Y remains the same as in the older counter.

The filters are also counted 10 min, 5 hr, and 24 hr after removal, but these results have not been included.

BETA ACTIVITY OF PARTICULATE MATTER IN PRECIPITATION

An oversized precipitation collector delivers 1 liter of water for each 0.1 in. of precipitation. The collector has a cross section of approximately 0.4 m^2.

Even during relatively dry periods this arrangement collects activity. By washing down the collector, with about 1 liter of distilled water, a suitable sample is obtained. These "wash" samples as well as any precipitation samples are reduced in volume, dry-plated on 1-in.-diam stainless steel planchets, and counted in a Sharp Widebeta Counting System, employing a gas flow, proportional, alpha and beta chamber. A cosmic ray umbrella with coincidence count cancel provides a low background for the system. The counting efficiency is determined by comparison with a Tracerlab standard of radiolead, which emits 1.17 MeV beta particles.

Samples are taken daily on work days. The precipitation collector is washed with 1 liter of water usually between 0800 and 0900 on the day of collection. When precipitation occurs, the wash is added to the collected precipitation.

RESULTS

Precipitation for 1966, 1967, and the average for a 31-year period is shown in Fig. 1. The average "per day" activity for 1966 and 1967 is presented in Figs. 2 and 3. Average per day values for air collected are weighted for sample periods of more than 1 day. Average per day values for the precipitation collection are the total activity collected during the month divided by the number of days. Table I summarizes the year's data.

Beta activities, presented in the monthly tabulations, are not identified; however, the measurements were made in the same manner as in previous years, making these results comparable to those presented in the earlier reports.

TABLE I

Summary 1967

Precipitation		20.80 in.
Air Samples	$\bar{X}$/sample	0.037×10^{-12} μCi/cc
12/30-1/3	Maximum	2.67×10^{-12} "
7/24-7/25 8/9-8/10 9/6-9/7 9/14-9/15 10/18-10/19	Minimum	$>0.01 \times 10^{-12}$ "
Precipitation Samples	Total	60,171 μμCi/m^2
	$\bar{X}$/day	162.6 "
12/28-12/29	Maximum	32,695 "
11/30-12/1	Minimum	0.3 "

JANUARY 1967

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Beta activity counted 7 days after collection: Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Dec. 30 (1966)	Jan. 3 (1967)	2.67×10^{-12}*	(1385)5542*	trace	Jan. 3	1400	18186.9
Jan. 3	Jan. 4	0.64×10^{-12}	627	0	Jan. 4	1400	1546.6
Jan. 4	Jan. 5	0.25×10^{-12}	125	0	Jan. 5	1400	887.0
Jan. 5	Jan. 6	0.90×10^{-12}	531	trace	Jan. 6	1400	1658.6
Jan. 6	Jan. 9	0.15×10^{-12}	(101)308	0	Jan. 9	1400	637.5
Jan. 9	Jan. 10	0.05×10^{-12}	71	0	Jan. 10	1400	48.7
Jan. 10	Jan. 11	0.05×10^{-12}	45	0	Jan. 11	1400	122.0
Jan. 11	Jan. 12	0.04×10^{-12}**	66	0	Jan. 12	1400	132.9
Jan. 12	Jan. 13	0.05×10^{-12}	40	0	Jan. 13	1400	17.3
Jan. 13	Jan. 16	0.23×10^{-12}	(46)139	0	Jan. 16	1400	149.5
Jan. 16	Jan. 17	1.23×10^{-12}	78	0	Jan. 17	1400	157.0
Jan. 17	Jan. 18	2.50×10^{-12}	149	0	Jan. 18	1400	272.4
Jan. 18	Jan. 19	0.92×10^{-12}	211	0	Jan. 19	1400	433.2
Jan. 19	Jan. 20	0.38×10^{-12}	24	0	Jan. 20	1400	119.5
Jan. 20	Jan. 23	0.18×10^{-12}	(8)24	0	Jan. 23	1400	75.8
Jan. 23	Jan. 24	0.25×10^{-12}	325	0.02	Jan. 24	1400	513.4
Jan. 24	Jan. 25	0.19×10^{-12}	210	0.09	Jan. 25	1400	380.8
Jan. 25	Jan. 26	0.25×10^{-12}	461	0	Jan. 26	1400	688.9
Jan. 26	Jan. 27	0.18×10^{-12}	33	0	Jan. 27	1400	180.3
Jan. 27	Jan. 30	0.12×10^{-12}	(9)27	0	Jan. 30	1400	25.5
Jan. 30	Jan. 31	0.06×10^{-12}	12**	trace	Jan. 31	1400	27.4
$\bar{X}$ "per day"		0.54×10^{-12}	292	0.005			
* Maximum		2.67×10^{-12}	1385	0.09			
** Minimum		0.04×10^{-12}	12	0			
Total		11.[illegible] $\times 10^{-12}$	9048	0.14			

FEBRUARY 1967

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Beta activity counted 7 days after collection: Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Jan. 31	Feb. 1	0.11×10^{-12}	25	0.08	Feb. 1	1400	25.1
Feb. 1	Feb. 2	0.16×10^{-12}	209	0	Feb. 2	1400	433.3
Feb. 2	Feb. 3	0.16×10^{-12}	151	0	Feb. 3	1400	42.6
Feb. 3	Feb. 6	0.17×10^{-12}	(58)175	trace	Feb. 6	1400	92.5
Feb. 6	Feb. 7	0.19×10^{-12}	46	trace	Feb. 7	1400	46.8
Feb. 7	Feb. 8	0.10×10^{-12}**	67	trace	Feb. 8	1400	67.2
Feb. 8	Feb. 9	0.31×10^{-12}	46	0	Feb. 9	1400	74.0
Feb. 9	Feb. 10	0.46×10^{-12}*	185	0	Feb. 10	1400	29.2
Feb. 10	Feb. 13	NO SAMPLE	(82)246	0.03	Feb. 13	1400	452.4
Feb. 13	Feb. 14	0.14×10^{-12}	21	0	Feb. 14	1400	155.2
Feb. 14	Feb. 15	NO SAMPLE	30	trace	Feb. 15	1400	56.8
Feb. 15	Feb. 16	0.28×10^{-12}	43	0	Feb. 16	1400	52.3
Feb. 16	Feb. 17	0.26×10^{-12}	10	0	Feb. 17	1400	165.3
Feb. 17	Feb. 20	0.15×10^{-12}	(6)18	trace	Feb. 20	1400	110.7
Feb. 20	Feb. 21	0.18×10^{-12}	85	0	Feb. 21	1400	99.4
Feb. 21	Feb. 23	0.18×10^{-12}	(10)20	0	Feb. 23	1400	39.5
Feb. 23	Feb. 24	0.13×10^{-12}	4**	0	Feb. 24	1400	24.5
Feb. 24	Feb. 27	NO SAMPLE	(295)885*	0.22	Feb. 27	1400	1554.8
Feb. 27	Feb. 28	0.16×10^{-12}	18	0	Feb. 28	1400	26.8
$\bar{X}$ "per day"		0.20×10^{-12}	82	0.013			
* Maximum		0.46×10^{-12}	295	0.22			
** Minimum		0.10×10^{-12}	4	0			
Total		3.14×10^{-12}	2284	0.37			

MARCH 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Feb. 28	Mar. 1	0.14×10^{-12}	10	0	Mar. 1	1400	18.6
Mar. 1	Mar. 2	0.12×10^{-12}	13	0	Mar. 2	1400	22.6
Mar. 2	Mar. 3	0.13×10^{-12}	9	0	Mar. 3	1400	23.2
Mar. 3	Mar. 6	0.16×10^{-12}	(119)358*	0.18	Mar. 6	1400	712.2
Mar. 6	Mar. 7	0.12×10^{-12}	16	0	Mar. 7	1400	32.4
Mar. 7	Mar. 8	0.71×10^{-12}*	42	0	Mar. 8	1400	67.1
Mar. 8	Mar. 9	0.31×10^{-12}	8	0	Mar. 9	1400	22.2
Mar. 9	Mar. 10	0.17×10^{-12}	11	0	Mar. 10	1400	30.5
Mar. 10	Mar. 13	0.11×10^{-12}	(78)234	0.13	Mar. 13	1400	270.8
Mar. 13	Mar. 14	0.16×10^{-12}	11	0	Mar. 14	1400	27.5
Mar. 14	Mar. 15	0.12×10^{-12}	35	0	Mar. 15	1400	72.1
Mar. 15	Mar. 16	0.09×10^{-12}	8	0	Mar. 16	1400	30.2
Mar. 16	Mar. 17	0.09×10^{-12}	10	0	Mar. 17	1400	28.2
Mar. 17	Mar. 20	0.07×10^{-12}**	(79)236	0.10	Mar. 20	1400	388.4
Mar. 20	Mar. 21	0.13×10^{-12}	4	0	Mar. 21	1400	19.2
Mar. 21	Mar. 22	0.16×10^{-12}	4	0	Mar. 22	1400	18.0
Mar. 22	Mar. 23	0.16×10^{-12}	4	0	Mar. 23	1400	18.5
Mar. 23	Mar. 24	0.12×10^{-12}	3**	0	Mar. 24	1400	18.7
Mar. 24	Mar. 27	0.14×10^{-12}	53	trace	Mar. 27	1400	75.0
Mar. 27	Mar. 28	0.12×10^{-12}	22	0	Mar. 28	1400	37.9
Mar. 28	Mar. 29	0.09×10^{-12}	4	0	Mar. 29	1400	21.8
Mar. 29	Mar. 30	0.16×10^{-12}	33	0.01	Mar. 30	1400	54.6
Mar. 30	Mar. 31	0.12×10^{-12}	8	0	Mar. 31	1400	29.8
$\bar{X}$ "per day"		0.16×10^{-12}	37	0.014			
* Maximum		0.71×10^{-12}	119	0.18			
** Minimum		0.07×10^{-12}	3	0			
Total		3.70×10^{-12}	1136	0.43			

APRIL 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Mar. 31	Apr. 3	0.07×10^{-12}	(7)20	trace	Apr. 3	1400	40.4
Apr. 3	Apr. 4	0.06×10^{-12}	5	0	Apr. 4	1400	27.1
Apr. 4	Apr. 5	0.05×10^{-12}**	6	0	Apr. 5	1400	31.1
Apr. 5	Apr. 6	0.10×10^{-12}	4	0	Apr. 6	1400	23.1
Apr. 6	Apr. 7	0.09×10^{-12}	4	0	Apr. 7	1400	14.4
Apr. 7	Apr. 10	0.15×10^{-12}	(3)8	0	Apr. 10	1400	60.0
Apr. 10	Apr. 11	0.17×10^{-12}	6	0	Apr. 11	1400	32.9
Apr. 11	Apr. 12	0.13×10^{-12}	5	0	Apr. 12	1400	19.9
Apr. 12	Apr. 13	0.16×10^{-12}	28*	trace	Apr. 13	1400	104.0
Apr. 13	Apr. 14	0.17×10^{-12}	11	0	Apr. 14	1400	35.1
Apr. 14	Apr. 17	0.20×10^{-12}*	(2)5**	trace	Apr. 17	1400	37.6
Apr. 17	Apr. 18	0.10×10^{-12}	18	0	Apr. 18	1400	51.4
Apr. 18	Apr. 19	0.06×10^{-12}	15	trace	Apr. 19	1400	48.1
Apr. 19	Apr. 20	0.13×10^{-12}	7	0	Apr. 20	1400	36.1
Apr. 20	Apr. 21	0.16×10^{-12}	3	0	Apr. 21	1400	25.1
Apr. 21	Apr. 24	0.11×10^{-12}	(2)7**	0	Apr. 24	1400	35.1
Apr. 24	Apr. 25	0.08×10^{-12}	7	0	Apr. 25	1400	30.4
Apr. 25	Apr. 26	0.15×10^{-12}	7	0	Apr. 26	1400	47.8
Apr. 26	Apr. 27	0.16×10^{-12}	10	0	Apr. 27	1400	32.9
Apr. 27	Apr. 28	0.08×10^{-12}	8	0	Apr. 28	1400	25.6
Apr. 28	May 1	0.07×10^{-12}	(2)5**	0	May 1	1400	31.8
$\bar{X}$ "per day"		0.12×10^{-12}	6	0.001			
* Maximum		0.20×10^{-12}	28	trace			
** Minimum		0.05×10^{-12}	2	0			
Total		2.45×10^{-12}	189	0.04			

MAY 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
May 1	May 2	0.04×10^{-12}	14	0	May 2	1400	49.9
May 2	May 3	0.09×10^{-12}	12	0	May 3	1400	27.0
May 3	May 4	0.09×10^{-12}	4	0	May 4	1400	33.4
May 4	May 5	0.08×10^{-12}	24	0	May 5	1400	34.2
May 5	May 8	0.05×10^{-12}	(1)2**	0	May 8	1400	25.3
May 8	May 9	0.05×10^{-12}	78	0	May 9	1400	27.0
May 9	May 10	0.05×10^{-12}	30	0	May 10	1400	25.4
May 10	May 11	0.07×10^{-12}	2	0	May 11	1400	36.8
May 11	May 12	0.07×10^{-12}	10	0	May 12	1400	29.8
May 12	May 15	0.08×10^{-12}	(3)10	trace	May 15	1400	54.9
May 15	May 16	0.06×10^{-12}	5	0	May 16	1400	30.2
May 16	May 17	0.03×10^{-12}	4	0	May 17	1400	47.5
May 17	May 18	0.05×10^{-12}	9	0	May 18	1400	39.4
May 18	May 19	0.05×10^{-12}	12	trace	May 19	1400	45.4
May 19	May 22	0.03×10^{-12}	(17)50	0	May 22	1400	70.6
May 22	May 23	0.04×10^{-12}	12	0	May 23	1400	38.9
May 23	May 24	0.05×10^{-12}	9	0	May 24	1400	18.9
May 24	May 25	0.02×10^{-12}**	11	0	May 25	1400	29.2
May 25	May 26	0.12×10^{-12}*	39	0.25	May 26	1400	91.7
May 26	May 29	0.07×10^{-12}	(111)334*	0.45	May 29	1400	1632.6
May 29	May 31	0.08×10^{-12}	(7)22	0	May 31	1400	34.7
$\bar{X}$ "per day"		0.06×10^{-12}	22	0.02			
* Maximum		0.12×10^{-12}	111	0.45			
** Minimum		0.02×10^{-12}	1	0			
Total		1.27×10^{-12}	693	0.72			

JUNE 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
May 31	June 1	0.03×10^{-12}	49	0.04	June 1	1400	36.4
June 1	June 2	0.04×10^{-12}	54	0.12	June 2	1400	180.5
June 2	June 5	0.01×10^{-12}**	(63)189*	0.40	June 5	1400	240.9
June 5	June 6	0.02×10^{-12}	30	0.02	June 6	1400	128.3
June 6	June 7	0.04×10^{-12}	22	0	June 7	1400	60.4
June 7	June 8	0.05×10^{-12}	5	0	June 8	1400	25.9
June 8	June 9	0.06×10^{-12}	8	0	June 9	1400	66.5
June 9	June 12	0.04×10^{-12}	(3)10	0	June 12	1400	60.1
June 12	June 13	0.04×10^{-12}	7	0	June 13	1400	44.0
June 13	June 14	0.02×10^{-12}	7	0	June 14	1400	31.3
June 14	June 15	0.06×10^{-12}	27	trace	June 15	1400	117.2
June 15	June 16	0.05×10^{-12}	11	trace	June 16	1400	24.5
June 16	June 19	0.01×10^{-12}**	(38)114	0.43	June 19	1400	428.3
June 19	June 20	0.07×10^{-12}*	24	0.25	June 20	1400	20.4
June 20	June 21	0.02×10^{-12}	54	0.09	June 21	1400	250.5
June 21	June 22	0.03×10^{-12}	4**	trace	June 22	1400	11.2
June 22	June 23	0.03×10^{-12}	9	trace	June 23	1400	41.0
June 23	June 26	0.02×10^{-12}	(38)114	0.19	June 26	1400	931.2
June 26	June 27	0.03×10^{-12}	9	0	June 27	1400	24.6
June 27	June 28	0.03×10^{-12}	4	0	June 28	1400	23.8
June 28	June 29	0.05×10^{-12}	7	0.01	June 29	1400	45.1
June 29	June 30	0.05×10^{-12}	20	0	June 30	1400	65.9
$\bar{X}$ "per day"		0.036×10^{-12}	25	0.051			
* Maximum		0.07×10^{-12}	63	0.43			
** Minimum		0.01×10^{-12}	4	0			
Total		0.80×10^{-12}	778	1.59			

JULY 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cc$)	Precipitation Collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^2$)
June 30	July 3	0.08×10^{-12}	(39)117	0.34	July 3	1400	295.6
July 3	July 5	0.08×10^{-12}	(90)179*	0.02	July 5	1400	357.8
July 5	July 6	0.10×10^{-12}*	50	0.62	July 6	1400	144.7
July 6	July 7	0.05×10^{-12}	72	0.21	July 7	1400	161.2
July 7	July 10	0.02×10^{-12}	(64)192	1.35	July 10	1400	251.2
July 10	July 11	0.03×10^{-12}	85	0.01	July 11	1400	264.0
July 11	July 12	0.04×10^{-12}	77	0.27	July 12	1400	522.8
July 12	July 13	0.03×10^{-12}	79	0.06	July 13	1400	287.8
July 13	July 14	0.03×10^{-12}	9	0	July 14	1400	15.5
July 14	July 17	0.01×10^{-12}	(72)216	1.86	July 17	1400	1798.9
July 17	July 18	0.01×10^{-12}	34	trace	July 18	1400	71.3
July 18	July 19	0.03×10^{-12}	7	0	July 19	1400	13.2
July 19	July 20	0.02×10^{-12}	47	0.05	July 20	1400	354.2
July 20	July 21	0.02×10^{-12}	87	0.04	July 21	1400	840.7
July 21	July 24	0.01×10^{-12}	(4)11	0.01	July 24	1400	37.4
July 24	July 25	$> 0.01 \times 10^{-12}$**	79	0.21	July 25	1400	645.7
July 25	July 26	0.03×10^{-12}	6**	trace	July 26	1400	14.9
July 26	July 27	0.03×10^{-12}	6**	trace	July 27	1400	16.3
July 27	July 28	0.03×10^{-12}	34	0	July 28	1400	132.9
July 28	July 31	0.02×10^{-12}	(17)50	0.67	July 31	1400	174.6
$\bar{X}$ "per day"		0.034×10^{-12}	46.4	0.19			
* Maximum		0.10×10^{-12}	90	1.86			
** Minimum		$> 0.01 \times 10^{-12}$	6	0			
Total		0.68×10^{-12}	1437	5.75			

AUGUST 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cc$)	Precipitation Collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^2$)
July 31	Aug. 1	0.02×10^{-12}	60	0.16	Aug. 1	1400	436.5
Aug. 1	Aug. 2	0.03×10^{-12}	23	trace	Aug. 2	1400	66.5
Aug. 2	Aug. 3	0.03×10^{-12}	67	0.07	Aug. 3	1400	294.8
Aug. 3	Aug. 4	0.01×10^{-12}	46	0.13	Aug. 4	1400	216.5
Aug. 4	Aug. 7	0.01×10^{-12}	(19)57	0.50	Aug. 7	1400	259.1
Aug. 7	Aug. 8	0.02×10^{-12}	5**	0.08	Aug. 8	1400	19.7
Aug. 8	Aug. 9	0.01×10^{-12}	135*	0.82	Aug. 9	1400	1233.7
Aug. 9	Aug. 10	$> 0.01 \times 10^{-12}$**	104	0.76	Aug. 10	1400	820.0
Aug. 10	Aug. 11	0.01×10^{-12}	50	0.47	Aug. 11	1400	240.8
Aug. 11	Aug. 14	0.01×10^{-12}	(14)41	0.23	Aug. 14	1400	53.5
Aug. 14	Aug. 15	0.02×10^{-12}	13	0.42	Aug. 15	1400	21.5
Aug. 15	Aug. 16	0.02×10^{-12}	34	0	Aug. 16	1400	56.5
Aug. 16	Aug. 17	0.13×10^{-12}*	5**	0	Aug. 17	1400	9.0
Aug. 17	Aug. 18	0.03×10^{-12}	9	trace	Aug. 18	1400	61.3
Aug. 18	Aug. 21	0.03×10^{-12}	(42)125	0.59	Aug. 21	1400	188.4
Aug. 21	Aug. 22	0.03×10^{-12}	17	0	Aug. 22	1400	27.6
Aug. 22	Aug. 23	0.03×10^{-12}	6	0.14	Aug. 23	1400	23.9
Aug. 23	Aug. 24	0.01×10^{-12}	5**	trace	Aug. 24	1400	29.3
Aug. 24	Aug. 25	0.02×10^{-12}	7	0	Aug. 25	1400	44.5
Aug. 25	Aug. 28	0.01×10^{-12}	(46)139	0.05	Aug. 28	1400	508.6
Aug. 28	Aug. 29	0.01×10^{-12}	5**	0.01	Aug. 29	1400	8.2
Aug. 29	Aug. 30	0.02×10^{-12}	25	0.01	Aug. 30	1400	55.0
Aug. 30	Aug. 31	0.03×10^{-12}	14	1.88	Aug. 31	1400	43.2
$\bar{X}$ "per day"		0.02×10^{-12}	32	0.20			
* Maximum		0.13×10^{-12}	135	1.88			
** Minimum		$> 0.01 \times 10^{-12}$	5	0			
Total		0.45×10^{-12}	992	6.35			

SEPTEMBER 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Sept. 1	Sept. 5	0.03×10^{-12}	(6)26	trace	Sept. 5	1400	13.4
Sept. 5	Sept. 6	0.02×10^{-12}	9	0	Sept. 6	1400	21.4
Sept. 6	Sept. 7	$> 0.01 \times 10^{-12}$**	83	0.38	Sept. 7	1400	719.7
Sept. 7	Sept. 8	0.02×10^{-12}	299*	0.32	Sept. 8	1400	528.6
Sept. 8	Sept. 11	0.01×10^{-12}	(75)225	0.67	Sept. 11	1400	338.7
Sept. 11	Sept. 12	0.03×10^{-12}	13	0	Sept. 12	1400	17.7
Sept. 12	Sept. 13	0.03×10^{-12}	9	0	Sept. 13	1400	16.4
Sept. 13	Sept. 14	0.03×10^{-12}	5	0	Sept. 14	1400	15.3
Sept. 14	Sept. 15	$> 0.01 \times 10^{-12}$**	7	0	Sept. 15	1400	16.7
Sept. 15	Sept. 18	0.02×10^{-12}	(11)35	trace	Sept. 18	1400	52.7
Sept. 18	Sept. 19	0.03×10^{-12}	7	0.01	Sept. 19	1400	11.9
Sept. 19	Sept. 20	0.02×10^{-12}	35	0.11	Sept. 20	1400	144.9
Sept. 20	Sept. 21	0.03×10^{-12}	10	0	Sept. 21	1400	21.3
Sept. 21	Sept. 22	0.02×10^{-12}	9	0	Sept. 22	1400	13.1
Sept. 22	Sept. 25	0.02×10^{-12}	(40)121	0.63	Sept. 25	1400	665.3
Sept. 25	Sept. 26	0.02×10^{-12}	56	0.29	Sept. 26	1400	182.7
Sept. 26	Sept. 27	0.03×10^{-12}	3	0	Sept. 27	1400	6.0
Sept. 27	Sept. 28	0.03×10^{-12}	8	0	Sept. 28	1400	12.5
Sept. 28	Sept. 29	0.02×10^{-12}	2**	0	Sept. 29	1400	4.8
$\bar{X}$ "per day"		0.02×10^{-12}	32	0.081			
* Maximum		0.03×10^{-12}	299	0.67			
** Minimum		$> 0.01 \times 10^{-12}$	2	0			
Total		0.43×10^{-12}	962	2.43			

OCTOBER 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Sept. 29	Oct. 2	0.03×10^{-12}	(2)6**	0	Oct. 2	1400	12.9
Oct. 2	Oct. 3	0.02×10^{-12}	2**	trace	Oct. 3	1400	5.7
Oct. 3	Oct. 4	0.02×10^{-12}	40*	0.15	Oct. 4	1400	295.3
Oct. 4	Oct. 5	0.02×10^{-12}	5	0	Oct. 5	1400	5.3
Oct. 5	Oct. 6	0.03×10^{-12}	2**	trace	Oct. 6	1400	11.3
Oct. 6	Oct. 9	0.05×10^{-12}	(2)7**	0	Oct. 9	1400	22.9
Oct. 9	Oct. 10	0.03×10^{-12}	7	trace	Oct. 10	1400	27.7
Oct. 10	Oct. 11	0.03×10^{-12}	5	0	Oct. 11	1400	30.6
Oct. 11	Oct. 12	0.06×10^{-12}	2**	0	Oct. 12	1400	38.8
Oct. 12	Oct. 13	0.05×10^{-12}	2**	0	Oct. 13	1400	25.5
Oct. 13	Oct. 16	0.02×10^{-12}	(1)3	0	Oct. 16	1400	21.8
Oct. 16	Oct. 17	0.04×10^{-12}	2**	0	Oct. 17	1400	21.2
Oct. 17	Oct. 18	0.05×10^{-12}	6	0	Oct. 18	1400	18.8
Oct. 18	Oct. 19	$> 0.01 \times 10^{-12}$**	13	0	Oct. 19	1400	30.3
Oct. 19	Oct. 20	0.08×10^{-12}	5	0	Oct. 20	1400	18.4
Oct. 20	Oct. 23	0.04×10^{-12}	(1)4	0	Oct. 23	1400	45.6
Oct. 23	Oct. 24	0.05×10^{-12}	4	0	Oct. 24	1400	33.8
Oct. 24	Oct. 25	0.02×10^{-12}	5	0	Oct. 25	1400	28.6
Oct. 25	Oct. 26	0.12×10^{-12}*	10	0	Oct. 26	1400	45.7
Oct. 26	Oct. 27	0.04×10^{-12}	37	0	Oct. 27	1400	40.0
Oct. 27	Nov. 1	0.02×10^{-12}	(5)23	0.10	Nov. 1	1400	21.3
$\bar{X}$ "per day"		0.040×10^{-12}	6.1	0.01			
* Maximum		0.12×10^{-12}	40	0.15			
** Minimum		$> 0.01 \times 10^{-12}$	2	0			
Total		0.83×10^{-12}	190	0.28			

NOVEMBER 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Nov. 1	Nov. 2	0.03×10^{-12}	5	0	Nov. 2	1400	22.2
Nov. 2	Nov. 3	0.02×10^{-12}	7	0	Nov. 3	1400	28.4
Nov. 3	Nov. 6	0.03×10^{-12}	(9)28	0.01	Nov. 6	1400	112.0
Nov. 6	Nov. 7	0.02×10^{-12}	22	0	Nov. 7	1400	31.4
Nov. 7	Nov. 8	0.02×10^{-12}	2	0	Nov. 8	1400	7.1
Nov. 8	Nov. 9	0.06×10^{-12}	4	0	Nov. 9	1400	8.8
Nov. 9	Nov. 10	0.04×10^{-12}	25	0	Nov. 10	1400	41.4
Nov. 10	Nov. 13	0.02×10^{-12}**	(2)7	0	Nov. 13	1400	21.4
Nov. 13	Nov. 14	0.02×10^{-12}	1**	0	Nov. 14	1400	12.8
Nov. 14	Nov. 15	0.02×10^{-12}	9	0	Nov. 15	1400	47.3
Nov. 15	Nov. 16	0.04×10^{-12}	7	0	Nov. 16	1400	28.8
Nov. 16	Nov. 17	0.04×10^{-12}	9	0	Nov. 17	1400	35.4
Nov. 17	Nov. 20	0.04×10^{-12}	(4)11	0	Nov. 20	1400	31.2
Nov. 20	Nov. 21	0.06×10^{-12}	8	0	Nov. 21	1400	19.6
Nov. 21	Nov. 22	0.06×10^{-12}	8	trace	Nov. 22	1400	25.8
Nov. 22	Nov. 27	0.05×10^{-12}	(3)17	0.06	Nov. 27	1400	33.8
Nov. 27	Nov. 28	0.03×10^{-12}	76*	trace	Nov. 28	1400	239.6
Nov. 28	Nov. 29	0.04×10^{-12}	61	0.14	Nov. 29	1400	707.2
Nov. 29	Nov. 30	0.08×10^{-12}*	7	0	Nov. 30	1400	15.7
$\bar{X}$ "per day"		0.036×10^{-12}	10.5	0.008			
* Maximum		0.08×10^{-12}	76	0.14			
** Minimum		0.02×10^{-12}	1	0			
Total		0.72×10^{-12}	314	0.23			

DECEMBER 1967

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne (μCi/cc)	Precipitation Collector (μμCi/m²)	Precipitation (in.)	Early count - - Precipitation Collector: Date of count	Time of count	Beta activity (μμCi/m²)
Nov. 30	Dec. 1	0.04×10^{-12}	0.3**	trace	Dec. 1	1400	6.6
Dec. 1	Dec. 4	0.04×10^{-12}	(2)6	trace	Dec. 4	1400	19.3
Dec. 4	Dec. 5	0.02×10^{-12}	8	0	Dec. 5	1400	15.4
Dec. 5	Dec. 6	0.03×10^{-12}	2	0	Dec. 6	1400	6.1
Dec. 6	Dec. 7	0.02×10^{-12}	5	0	Dec. 7	1400	36.6
Dec. 7	Dec. 8	0.01×10^{-12}**	5	trace	Dec. 8	1400	20.4
Dec. 8	Dec. 11	0.14×10^{-12}	(6)19	0.10	Dec. 11	1400	31.7
Dec. 11	Dec. 12	0.02×10^{-12}	8	0	Dec. 12	1400	23.8
Dec. 12	Dec. 13	0.04×10^{-12}	162	0.82	Dec. 13	1400	350.0
Dec. 13	Dec. 14	0.02×10^{-12}	213	0.13	Dec. 14	1400	791.9
Dec. 14	Dec. 15	0.01×10^{-12}**	59	0.19	Dec. 15	1400	142.8
Dec. 15	Dec. 18	0.02×10^{-12}	(88)264	0.80	Dec. 18	1400	377.6
Dec. 18	Dec. 19	0.04×10^{-12}	19	0.22	Dec. 19	1400	38.7
Dec. 19	Dec. 20	0.06×10^{-12}	91	0.28	Dec. 20	1400	239.9
Dec. 20	Dec. 21	0.02×10^{-12}	8	0	Dec. 21	1400	14.4
Dec. 21	Dec. 22	0.02×10^{-12}	5	0	Dec. 22	1400	6.4
Dec. 22	Dec. 26	0.09×10^{-12}	(3)10	0	Dec. 26	1400	9.1
Dec. 26	Dec. 27	0.04×10^{-12}	3	0	Dec. 27	1400	10.3
Dec. 27	Dec. 28	NO SAMPLE	4	0	Dec. 28	1400	6.6
Dec. 28	Dec. 29	0.47×10^{-12}	32695 *	0.15	Dec. 29	1400	32538.6
Dec. 29	Jan. 2 (1968)	0.77×10^{-12}*	(2181)8562	0.02	Jan. 2 (1968)	1400	8562.3
$\bar{X}$ "per day"		0.10×10^{-12}	1359.6	0.088			
* Maximum		0.77×10^{-12}	32695	0.82			
** Minimum		0.01×10^{-12}	0.3	0			
Total		1.92×10^{-12}	42148	2.74			

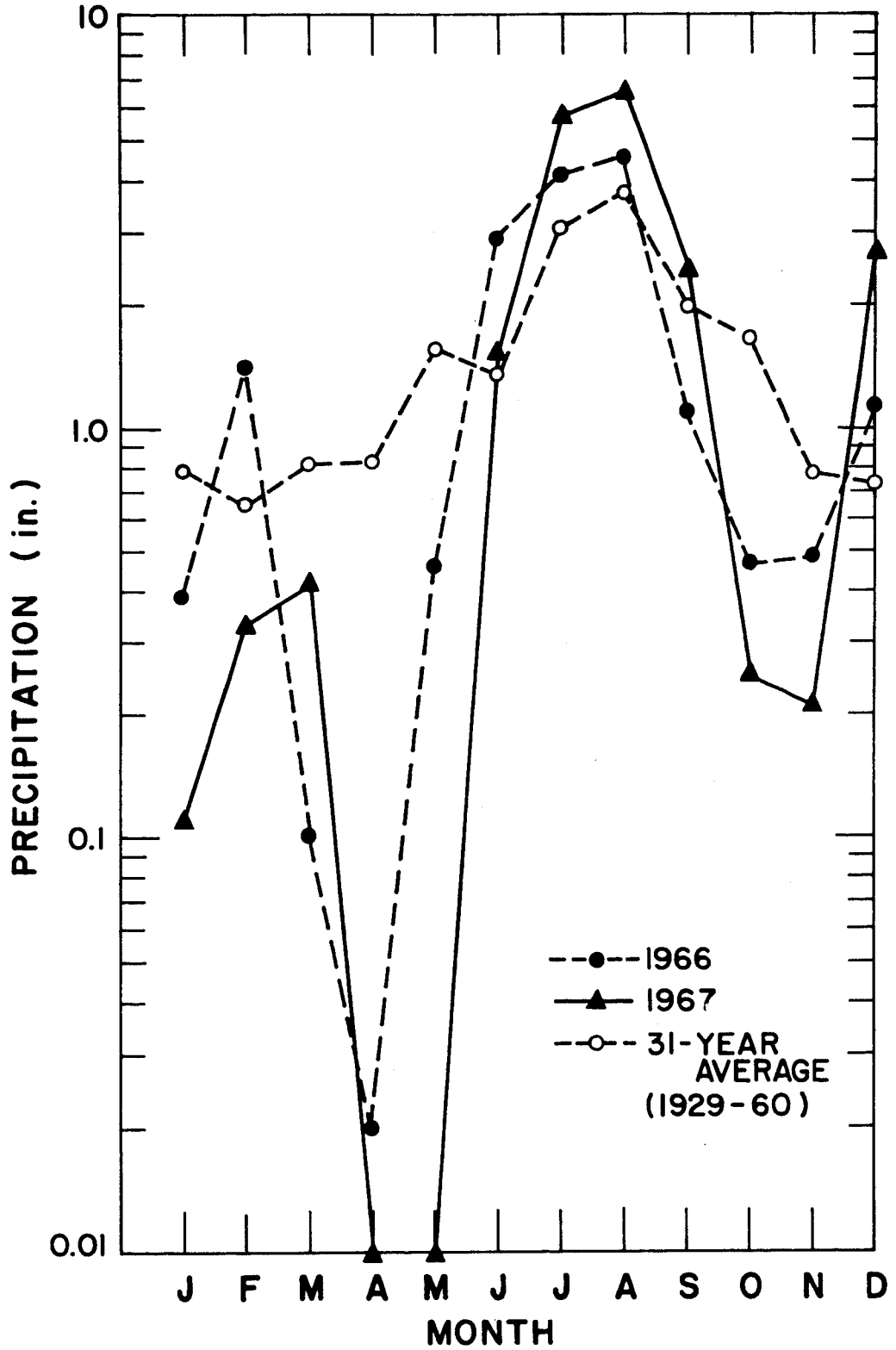

Fig. 1. Total monthly precipitation.

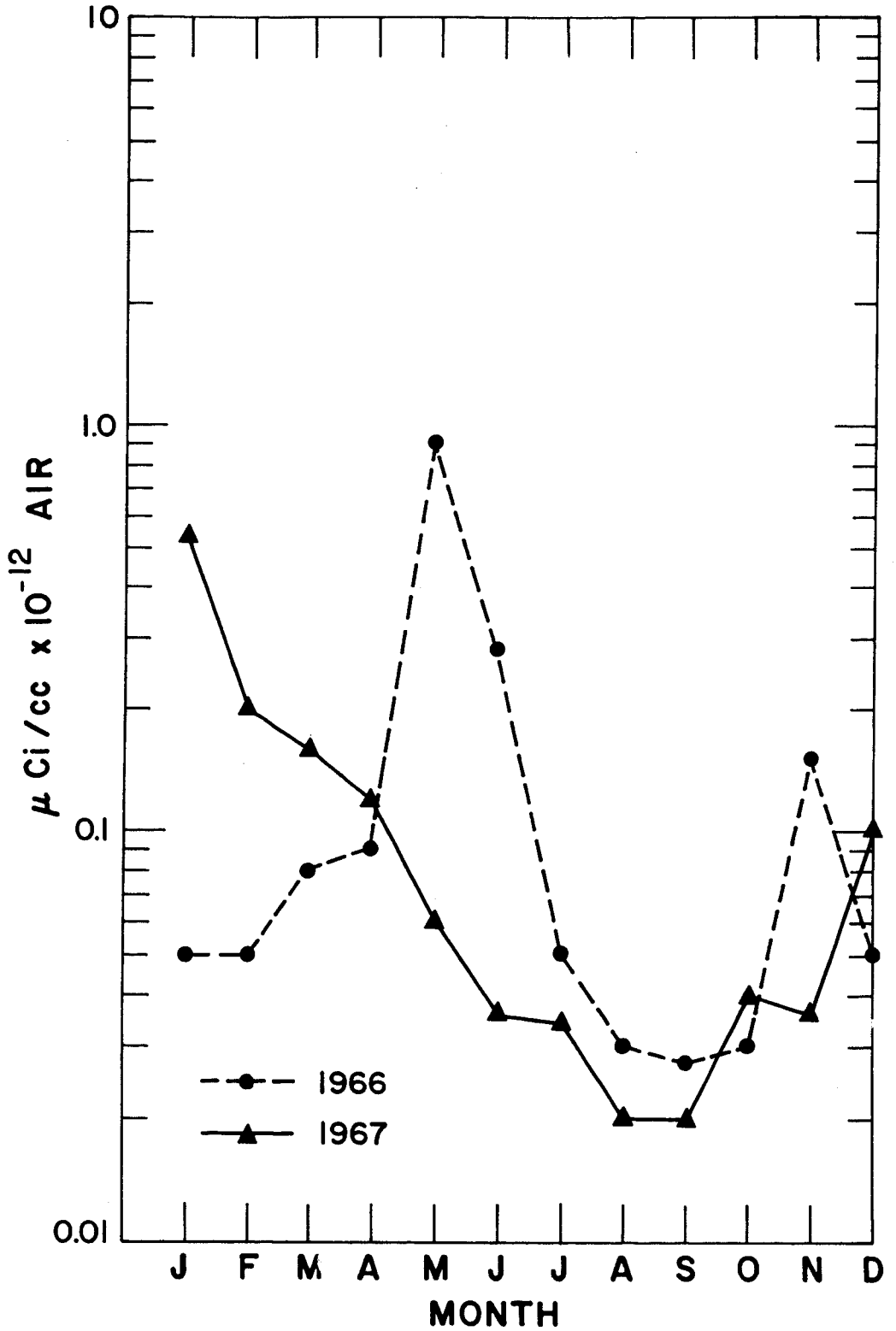

Fig. 2. Average "per day" activity found in air filter samples.

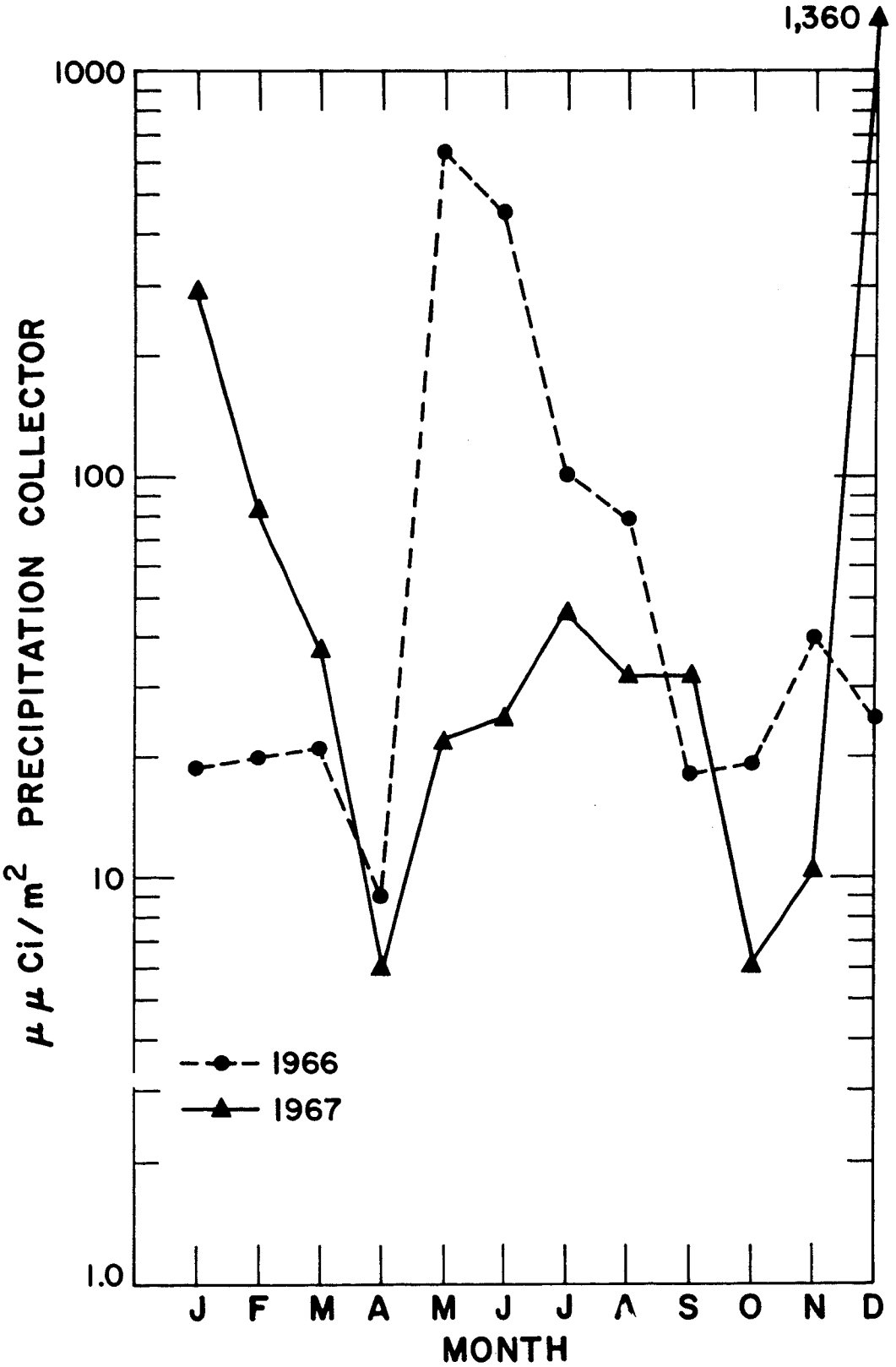

Fig. 3. Average "per day" activity found in precipitation collector samples.